FA3

(12) UK Patent Application (19) GB (11) 2 330 815 (13) A

(43) Date of A Publication 05.05.1999

(21) Application No 9823584.9

(22) Date of Filing 29.10.1998

(30) Priority Data
(31) 9722748 (32) 29.10.1997 (33) GB

(71) Applicant(s)
Safeway Stores Plc
(Incorporated in the United Kingdom)
P O Box 8, 6 Millington Road, HAYES, Middlesex, UB3 4AY, United Kingdom

(72) Inventor(s)
David John Humphreys
Kevin Christopher Spencer

(74) Agent and/or Address for Service
W P Thompson & Co
Coopers Building, Church Street, LIVERPOOL, L1 3AB, United Kingdom

(51) INT CL^6
B65B 31/00 // A23L 3/3445

(52) UK CL (Edition Q)
B8C CWP3 C205

(56) Documents Cited
EP 0346201 A2 WO 93/19629 A1 WO 93/17652 A1

(58) Field of Search
UK CL (Edition Q) B8C CF11 CF12 CWP3
INT CL^6 A23B 4/14 4/16 7/152 , A23L 3/3445 , B65B 31/00 31/02 , B65D 81/20
Online: WPI

(54) Abstract Title
Preservation of meat and meat products

(57) Preservation of meat and meat products comprises storing the meat or meat products in an atmosphere comprising argon and one or both of oxygen and carbon dioxide. The meat is preferably stored in a gas impermeable container into which the gas mixture has been introduced prior to sealing.

GB 2 330 815 A

DESCRIPTION

PRESERVATION OF MEAT, PROCESSED AND COOKED MEATS AND MEAT PRODUCTS

The present invention relates to the preservation of meat, processed and cooked meats and meat products, for example uncooked beef, lamb, pork, chicken and turkey, cooked ham, cooked turkey, cooked beef, cooked pork, bacon and sausages, to name but a few.

It is known to prolong the shelf life of such products by gas-packaging them in a mixture of nitrogen and carbon dioxide. The nitrogen content varies from 50 to 75% and the carbon dioxide from 50 to 25% and a typical mixture comprises 65% nitrogen and 35% carbon dioxide. Another known gas mixture for use with fresh meat comprises 60% to 70% oxygen and the balance carbon dioxide.

Such gas mixtures are effective in reducing the severity of the oxidising atmosphere and therefore increase the shelf life of the product. However, one disadvantage with such known gas mixtures is that the carbon dioxide content discolours many meats. Thus, whilst the use of such gas mixtures increases the time for which a product may be safely kept the product itself may not be particularly visually appealing to potential customers.

It is thus an object of the present invention to allow such products to be stored and/or displayed

without discolouring and without unacceptable deterioration of taste and smell, and thereby to extend the useful shelf life of the product.

In accordance with a first aspect of the present invention a method of preserving meat, processed and cooked meats and meat products comprises storing the products in a gas mixture comprising argon and one or both of carbon dioxide and oxygen.

Such a mixture does not discolour the meat products and yet maintains the product quality (taste, smell, texture etc) for a considerably longer period, thereby increasing the useful shelf life. The optional use of oxygen in the mixture enhances the colour of certain meat products, particularly red meat products, yet the presence of argon (and optionally carbon dioxide) greatly reduces the oxidising properties of the gas mixture as a whole.

The method of the present invention also results in lower residual oxygen levels as compared with the prior art, whilst still maintaining an attractive visual appearance on the products, whilst using a similar amount of gas to the prior art techniques.

Preferably, argon forms the largest proportion of the mixture. It has been found that a minimum of 45% of argon is desirable.

For example, the gas mixture may comprise 55%, 60%, 75%, 80% or 90% argon, the remaining portion of

the mixture being formed by carbon dioxide and/or oxygen in varying proportions.

In accordance with a second aspect of the present invention, there is provided a process for packaging meat, processed and cooked meats and meat products, comprising packaging the food in a substantially gas-impermeable packaging, introducing into the container a gas mixture comprising argon and one or both of carbon dioxide and oxygen and sealing the container to retain the gas mixture within the container.

By way of example only, specific examples of the present invention will now be described.

Meat or meat products are prepared in the conventional manner suitable for packaging on standard equipment currently used for packaging meat and meat products with an atmosphere of nitrogen and carbon dioxide. For example, for cooked meats the raw meat may be trimmed, seasoned, cooked and sliced. For preserved (as opposed to cooked) products, such as bacon, the cooking step may be replaced with a different step such as a preservation step.

During packing of the meat into separate packages (and, optionally, additionally during storage of the products prior to packaging) the product is stored in an atmosphere comprising a mixture of argon and one or both of carbon dioxide and oxygen. For example, the mixture may comprise 45%, 55%, 60%, 75%, 80% or 90% of

argon by volume. The remaining 55%, 45%, 40%, 25%, 20% or 10% respectively of the mixture can have varying proportions of carbon dioxide and oxygen, ranging from 0% to 100% by volume. Typically for cooked and/or processed meats with an approximately 70% argon content carbon dioxide and oxygen may be present in as approximately 30% carbon dioxide and less than 1% oxygen by volume. Another gas mixture which has been found to be particularly effective for cooked and/or processed meats comprises 75% argon and 25% carbon dioxide by volume.

It has been found that packaging meat products with such gas mixtures increases the quality (in particular the appearance) of the product and improves the taste and smell. Indeed, for some meat products (particularly containing red meat) the presence of oxygen enhances the colour of the product whilst the overall oxygen-deficient atmosphere retards the oxidation of the products. Thus, the products can be stored for a longer period in a condition which is not only safe but which is appealing to the consumer.

As for the known mixture of nitrogen and carbon dioxide, the products are packaged in substantially impermeable packaging material, whereby the composition of the storage atmosphere remains substantially constant in use.

In a second example, particularly suitable for

uncooked meat, and in particular uncooked pork, the meat is packed in substantially gas impermeable packaging in an atmosphere comprising 60% argon, 30% carbon dioxide and 10% oxygen. It is thought that the inclusion of a small proportion of oxygen contributes significantly to the maintenance of the quality of the product (and in particular the appearance, taste and smell of the product) whilst the presence of argon and carbon dioxide suppresses the oxidising characteristics of the oxygen.

Other examples of gas mixtures for use with raw meat (e.g. pork escalopes or mince and beef) include:-

70% argon	20% oxygen	10% carbon dioxide
60% argon	30% oxygen	10% carbon dioxide
55% argon	25% oxygen	20% carbon dioxide
45% argon	45% oxygen	10% carbon dioxide

The present invention is applicable to a wide range of meat and meat products such as uncooked beef, lamb, pork, chicken and turkey, cooked ham, cooked turkey, cooked pork, cooked beef, smoked ham, honey roast ham, processed meats such as bacon and sausages and products containing such items. The invention is also applicable to whole or sliced portions of such products.

All of the above examples may, if desired, be used in conjunction with techniques of so-called "cryogrinding", i.e. grinding or mincing the products

in a liquefied gas environment. For example meat (such as beef, pork and lamb) may be ground in a 100% liquid carbon dioxide or 100% liquid argon environment in a conventional cryogrinder prior to being packaged as described above.

Whether or not the present invention is used in conjunction with cryogrinding techniques, tests on products packaged in accordance with the present invention reveal significant reductions in microbial activity and consistently high scores in taste and appearance tests. It has also been found that the present invention results in significantly lower levels of residual oxygen, whilst permitting sufficient levels of oxygen to enhance the visual appearance of the food. All of these benefits can be achieved by using approximately the same volumes of gas (or even less) as are used in the prior art techniques.

The invention is not restricted to the details of the foregoing examples.

CLAIMS

1. A method of preserving meat, processed and cooked meats and meat products, comprising storing the products in a gas mixture comprising argon and one or both of carbon dioxide and oxygen.

2. A method as claimed in claim 1, wherein the products are stored in a container which encloses the gas mixture.

3. A method as claimed in claim 2, wherein the container is substantially impermeable to the gas mixture.

4. A method as claimed in any of claims 1 to 3, wherein argon forms the largest portion of the gas mixture.

5. A method as claimed in claim 4, wherein the gas mixture comprises at least 45% argon by volume.

6. A method as claimed in claim 5, wherein the gas mixture comprises at least 55% argon by volume.

7. A method as claimed in claim 4, wherein the gas mixture comprises at least 60% argon by volume.

8. A method as claimed in claim 4, wherein the gas mixture comprises at least 75% argon by volume.

9. A method as claimed in claim 4, wherein the gas mixture comprises at least 80% argon by volume.

10. A method as claimed in claim 4, wherein the gas mixture comprises at least 90% argon by volume.

11. A method as claimed in claim 4,

comprising approximately 70% argon by volume, approximately 30% carbon dioxide by volume and less than 1% oxygen by volume.

12. A method as claimed in claim 4, wherein the gas mixture comprises approximately 60% argon by volume, approximately 30% carbon dioxide by volume and approximately 10% oxygen by volume.

13. A method as claimed in claim 4, wherein the gas mixture comprises approximately 75% argon by volume and approximately 25% carbon dioxide by volume.

14. A method as claimed in claim 4, wherein the gas mixture comprises approximately 70% argon by volume, approximately 20% oxygen by volume and approximately 10% carbon dioxide by volume.

15. A method as claimed in claim 4, wherein the gas mixture comprises approximately 60% argon by volume, approximately 30% oxygen by volume and approximately 10% carbon dioxide by volume.

16. A method as claimed in claim 4, wherein the gas mixture comprises approximately 55% argon by volume, approximately 25% oxygen by volume and approximately 20% carbon dioxide by volume.

17. A method as claimed in claim 4, wherein the gas mixture comprises approximately 45% argon by volume, approximately 45% oxygen by volume and approximately 10% carbon dioxide by volume.

18. A process for packaging meat, processed

and cooked meats and meat products, comprising packaging the food in a substantially gas-impermeable packaging, introducing into the container a gas mixture comprising argon and one or both of carbon dioxide and oxygen and sealing the container to retain the gas mixture within the container.

19. A process as claimed in claim 18, wherein argon comprises the largest proportion of the gas mixture.

20. A process as claimed in claim 19, wherein the gas mixture comprises at least 45% argon by volume.

21. A process as claimed in claim 19, wherein the gas mixture comprises at least 55% argon by volume.

22. A process as claimed in claim 19, wherein the mixture comprises at least 60% argon by volume.

23. A process as claimed in claim 19, wherein the gas mixture comprises at least 75% argon by volume.

24. A process as claimed in claim 19, wherein the gas mixture comprises at least 80% argon by volume.

25. A process as claimed in claim 19, wherein the gas mixture comprises at least 90% argon by volume.

26. A process as claimed in claim 19,

comprising approximately 70% argon by volume, approximately 30% carbon dioxide by volume and less than 1% oxygen by volume.

27. A process as claimed in claim 19, wherein the gas mixture comprises approximately 60% argon by volume, approximately 30% carbon dioxide by volume and approximately 10% oxygen by volume.

28. A process as claimed in claim 19, wherein the gas mixture comprises approximately 75% argon by volume and approximately 25% carbon dioxide by volume.

29. A process as claimed in claim 19, wherein the gas mixture comprises approximately 70% argon by volume, approximately 20% oxygen by volume and approximately 10% carbon dioxide by volume.

30. A process as claimed in claim 19, wherein the gas mixture comprises approximately 60% argon by volume, approximately 30% oxygen by volume and approximately 10% carbon dioxide by volume.

31. A process as claimed in claim 19, wherein the gas mixture comprises approximately 55% argon by volume, approximately 25% oxygen by volume and approximately 20% carbon dioxide by volume.

32. A process as claimed in claim 19, wherein the gas mixture comprises approximately 45% argon by volume, approximately 45% oxygen by volume and approximately 10% carbon dioxide by volume.

33. A process as claimed in any of claims 18

to 32, wherein the food is ground in a liquefied gas prior to being packaged.

34. A process as claimed in claim 33, wherein the food is ground in substantially 100% liquid carbon dioxide.

35. A process as claimed in claim 33, wherein the food is ground in substantially 100% liquid argon.

36. A process as claimed in any of claims 33 to 35, wherein the food is ground in a cryogrinder.

37. A method of preserving meat, processed and cooked meats and meat products, substantially as herein described.

38. A process for packaging meat, processed and cooked meats and meat products, substantially as herein described.

The Patent Office

INVESTOR IN PEOPLE

12

Application No: GB 9823584.9 **Examiner:** Steve Wintersgill
Claims searched: 1 to 38 **Date of search:** 5 February 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): B8C (CF11, CF12, CWP3)

Int Cl (Ed.6): A23B 4/14, 4/16, 7/152; A23L 3/3445; B65B 31/00, 31/02; B65D 81/20.

Other: Online: WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	EP 0,346,201 A2	(L'AIR LIQUIDE) see Examples 1 to 3.	1 to 5.
X	WO 93/19629 A1	(L'AIR LIQUIDE) see especially Example 8, page 87 and Example 15, page 133.	1 to 10 and 18 to 25.
X	WO 93/17652 A1	(L'AIR LIQUIDE) see page 13 line 1 to page 14 line 2.	1 to 11, 13, 14, 18 to 26, 28, 29, 33, 35, 37 and 38.

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.